

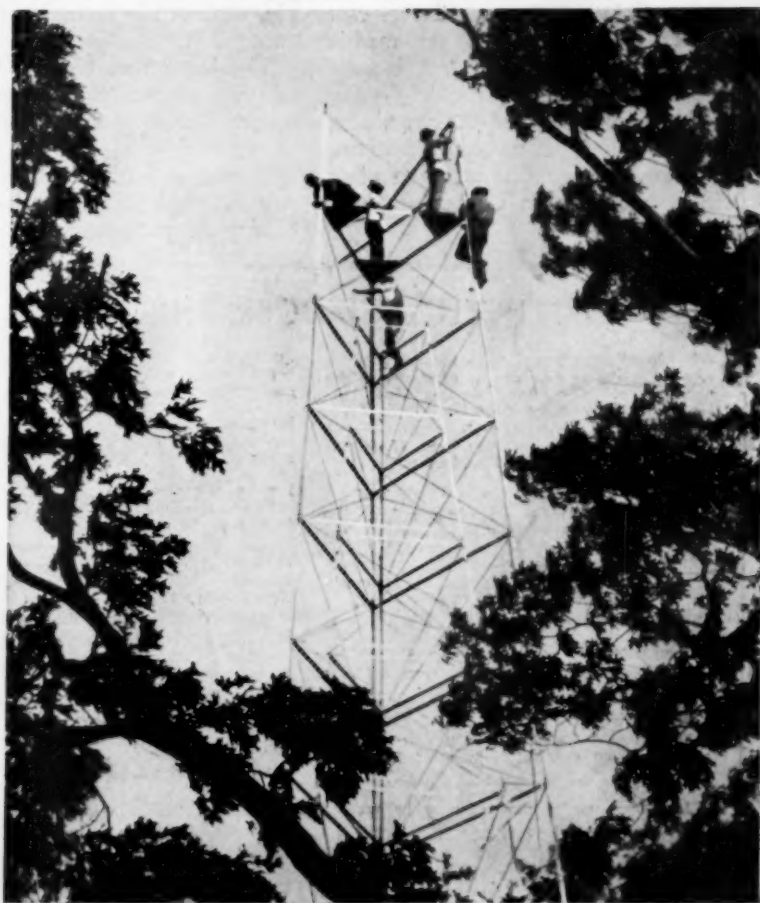
PRICE  
15¢

PERIODICAL ROOM  
GENERAL LIBRARY  
UNIV. OF MICH

NOV 28 1935 X

# SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



NOVEMBER 25, 1933

Erecting a Bilby Tower

See Page 339

A

SCIENCE SERVICE PUBLICATION

## SCIENCE NEWS LETTER

VOL. XXIV

No. 639

The Weekly  Current  
Summary of Science

Published by

## SCIENCE SERVICE

The Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

Edited by WATSON DAVIS

Subscription rates—\$5.00 a year postpaid; two years \$7.00; 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Back numbers more than six months old, 25 cents.

Canadian and foreign subscribers please add two dollars (\$2.00) per year to regular subscription rates to cover postage.

In requesting change of address, please give your old address as well as the new one in notification to Circulation Department, SCIENCE NEWS LETTER, 21st and Constitution Ave., Washington, D. C., at least two weeks before change is to become effective.

Advertising rates furnished on application.

## Board of Trustees of Science Service

Honorary President, William E. Ritter, University of California. Representing the American Association for the Advancement of Science, J. McKeen Cattell, President, Editor, Science, Garrison, N. Y.; Burton E. Livingston, Johns Hopkins University, Baltimore, Md.; Raymond Pearl, Director, Institute for Biological Research, Johns Hopkins University, Baltimore, Md. Representing the National Academy of Sciences, W. H. Howell, Vice-President and Chairman of Executive Committee, Johns Hopkins University, Baltimore, Md.; R. A. Millikan, Director, Norman Bridge Laboratory of Physics, California Institute of Technology, Pasadena, Calif.; David White, Senior Geologist, U. S. Geological Survey. Representing National Research Council, Vernon Kellogg, Secretary Emeritus, National Research Council, Washington, D. C.; C. G. Abbot, Secretary, Smithsonian Institution, Washington, D. C.; Harrison E. Howe, Editor of Industrial and Engineering Chemistry. Representing Journalistic Profession, John H. Pinley, Associate Editor, New York Times; Mark Sullivan, Writer, Washington, D. C.; Marlen E. Pew, Editor of Editor and Publisher, New York City. Representing E. W. Scripps Estate, Harry L. Smithton, Treasurer, Cincinnati, Ohio; Robert P. Scripps, Scripps-Howard Newspapers, West Chester, Ohio; Thomas L. Sidlo, Cleveland, Ohio.

## Staff of Science Service

Director, Watson Davis; Staff writers: Frank Thone, Emily C. Davis, Jane Stafford, Marjorie Van de Water, J. W. Young; Librarian, Minna Gill; Sales and Advertising Manager, Hallie Jenkins.

Copyright, 1933, by Science Service, Inc. Reproduction of any portion of the SCIENCE NEWS LETTER is strictly prohibited since it is distributed for personal, school, club or library use only. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicate services issued by Science Service, details and samples of which will gladly be sent on request.

Members of the American Association for the Advancement of Science have the privilege of subscribing to the SCIENCE NEWS LETTER at the reduced price of \$3 per year. Application for this privilege should be accompanied by privilege card obtained from the Permanent Secretary, A. A. A. S., Smithsonian Institution Building, Washington, D. C.

Publication Office, 1930 Clifton Ave., Baltimore, Md., Editorial and Executive Office, Constitution Ave. at 21st St., N. W., Washington, D. C.

Address all communications to Washington, D. C. Cable address: Scienserve, Washington.

Entered as second class matter October 1, 1926, at the post-office at Baltimore, Md., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trade-mark, U. S. and Canadian Patent Offices.

## DO YOU KNOW?

The elephant's keenest sense is his sense of smell.

Hunting wild swans is prohibited by federal law in the United States at all times.

Because of over-cultivation, the silkworm of Japan is delicate and difficult to raise.

Birds may have a development of breast muscles, for operating their wings, equal to one-fifth of their total weight.

Medical records were kept in the temple of Aesculapius in Greece, case histories being registered on marble tablets.

Ephedrine, discovered ten years ago, and used widely in nasal preparations, is obtained from a Chinese drug plant used as a cure-all in China for 5,000 years.

Tests show that yellow corn contains more vitamin A than white corn.

Trees planted so as to shelter a house may save as much as 15 per cent. in fuel bills.

The oldest written record of a horse show known is in a book written in England in 1174.

In testing the strength of healing wounds, surgeons use many of the tests known to engineering science.

Cataract, an eye disease ordinarily associated with middle aged and old people, occasionally occurs in children.

The last census showed that 86 out of every 100 farms in this country were operated entirely with horses or mules.

Recent chemical discoveries may result in greater use of tobacco instead of arsenic preparations in insecticides.

## WITH THE SCIENCES THIS WEEK

## ASTRONOMY

What is the average density of matter in the universe? p. 341. *The Expanding Universe—Sir Arthur Eddington—Macmillan, 1933, \$2.*

Where were most Leonids meteors seen? p. 348. *Our Stone-Pelted Planet—H. H. Nininger—Houghton Mifflin, 1933, \$5.*

## AVIATION—PHYSICS

How has the radio range-beacon been improved? p. 341.

## CHEMISTRY

How many concerns are seeking to quicken whiskey? p. 342.

What is acetamide? p. 342.

## ENGINEERING

How long does it take to erect a Bilby tower? p. 339.

## GENERAL SCIENCE

How would Dr. Hrdlicka protect scientific treasures from destruction by war? p. 344.

## GENETICS

How may evolutionary changes be speeded in plants? p. 345.

## ICHTHYOLOGY

Can a fish live without air? p. 350. *A History of Fishes—J. R. Norman—Stokes, 1931, \$7.50.*

## MEDICINE

How does infantile paralysis virus enter a person's body? p. 340.

How may food sensitivity deform the face? p. 344.

Why was it important to learn that mice can contract sleeping sickness? p. 348.

## METEOROLOGY

What do sunspots have to do with weather? p. 343. *The Drama of Weather—Sir Napier Shaw—Macmillan, 1933, \$3.50.*

## PALEONTOLOGY

Where were fossils of America's latest primate found? p. 343.

## PHOTOGRAPHY

How many miles of flight will 800 feet of movie film photograph? p. 343.

## PHYSICS

What solutions cannot be heated by short radio waves? p. 345.

## PHYSIOLOGY

How are normal men physiologically unlike freaks? p. 345.

How is an expression of weeping unlike one of fury? p. 346. *Simple Lessons in Human Anatomy—B. C. H. Harvey—Amer. Med. Assn., 1931, \$2.*

What chemical dilates the blood vessels? p. 348.

What is the speed limit of auditory nerve fibers? p. 339.

## PSYCHIATRY

What is schizophrenia? p. 340.

## PUBLIC HEALTH

How should amebic dysentery be combated? p. 342.

What is likely to delay the conquest of tuberculosis? p. 345.

What is the new scarlet fever control method? p. 342.

## SOCIOLOGY

What did people throw away from 1893 to 1903? p. 341.

## VETERINARY MEDICINE

How do the Swiss keep their cattle fertile? p. 345.

What is the turkey's worst scourge? p. 344.

These curiosity-arousing questions show at a glance the wide field of scientific activity from which this week's news comes. Book references in italic type are not sources of information for the article, but are references for further reading. Books cited can be supplied by Book Dept., Science News Letter, at publishers' prices, prepaid in the United States.

## PHYSIOLOGY

# Auditory Nerve Cannot Carry Highest Audible Frequencies

Scientists Detect Frequencies Up to 2800 Cycles in Nerve But Cannot Explain How Higher Pitches Reach Brain

**H**OW CAN you tell the highest note of the violin from the deepest boom of the bass tuba? The puzzle of how to account for the ability of the human auditory mechanism to perceive various pitches was the subject of researches reported to the meeting of the National Academy of Sciences in Cambridge by Drs. H. Davis, A. Forbes, and A. J. Derbyshire, all of Harvard Medical School.

Although their findings have thrown considerable light on the problem they have also served to complicate it, because they serve to demonstrate that one of the familiar theories of hearing may apply to the hearing of low tones, but not of the highest pitches of stringed instruments and shrill squeaks.

This theory of hearing assumes that the high pitch is perceived as different from the low pitch because the frequency of the sound waves is transmitted to the higher nervous centers as a corresponding frequency of the nerve impulses in the auditory nerve. Other nerves in the body are not able to respond to impulses following each other as rapidly as the succeeding waves of a high pitched sound. But this theory has also assumed that the auditory nerve might have a much briefer recovery period than other nerves.

## "Listen in" on Cat Nerves

The Harvard researchers picked up the action currents from the auditory nerves of an anesthetized cat by a sort of "listening in" arrangement and measured them on a cathode ray oscillograph. They found that when the sound reaching the ear was of a frequency of 700 or lower—that is, below the upper limit of the cello or alto singing voice—the frequency of the action currents of the auditory nerve was exactly the same.

Between 700 and 900, a sharp change occurs in the amplitude of the waves picked up. It drops to approximately half the size of those produced by equally loud sounds of lower frequen-

cies. This is interpreted by the investigators as meaning that the nerve fibers have reached their speed limit and now respond to only one of each two successive waves. Since only half the fibers respond to any one wave, the size of the response is only half as great as when all were working.

At a frequency of 1700—somewhere among the high notes of the flute and violin and above the limit of the clarinet—another drop occurs indicating a breaking up of the nerve fibers into three groups each responding to every third wave.

## Not Unique

At a frequency of 2800, however, the responses become completely irregular.

"The auditory nerve is in no way unique in respect to its ability to transmit high frequencies of impulses," the investigators concluded. "Furthermore, even by virtue of rotation of activity, the



FULL HEIGHT

frequency of stimulation is not represented centrally above 2800 per second. Therefore, pitch discrimination for high tones must depend upon some selective activity in the cochlea and not involve the frequency of nerve impulses. For tones of low pitch, however, a frequency theory is still possible."

*Science News Letter, November 25, 1933*

## ENGINEERING

# Steel Towers Go Up and Down To Speed Survey of Country

See Front Cover

**W**ORK ON control surveys of the United States is being rapidly pushed forward under funds recently provided by the Public Works Administration to The U. S. Coast and Geodetic Survey. Although the immediate purpose is to provide employment to a great number of men, the present program fits into the plan to cover the country with a close network of triangulation stations so that no point will be more than  $12\frac{1}{2}$  miles from a station. Boundaries of private properties and political units may then be much more certain and much costly litigation may be avoided.

Press representatives in Washington were recently allowed a peep behind

the scenes when they were invited to witness the erection of one of the triangulation towers on the campus of the University of Maryland. The tower, which is shown, in the process of erection, on the cover of this issue of SCIENCE NEWS LETTER, although approximately 100 feet high, was put up in only about three hours. It is a double structure, the outer portion, supporting the observer's platform and the light, being without contact with the inner tower on which the surveying instrument is placed, so as to prevent any jarring of the instrument.

The sections of the tower, which was designed in 1927 by Jasper S. Bilby of the U. S. Coast and Geodetic Survey,



look like giant counterparts of a child's erector set. And they are handled almost as easily by the skilled workmen. As you may see at the top of the photograph, the workman holds the 13-foot piece of steel in one hand while he fastens the bolt in place with the other, although the steel weighs about 132 pounds. As the tower increases in height, the motor of the truck is used to hoist the sections up to the workmen.

When completed, the tower is exactly plumb and sturdy enough not to be

swayed in the slightest by the winds.

Before this modern tower was designed, it was necessary to take great care in building a thoroughly braced wooden structure for the purpose. At least two days were required to build the old type of tower, and then the material had to be discarded when the triangulations were completed. One of the great advantages of the Bilby tower is that it can be easily dismantled and re-erected repeatedly on new locations.

*Science News Letter, November 25, 1933*

#### MEDICINE

## Nerves Give Two-Way Transport to Paralysis Virus

**Dr. Flexner Reports Path of Invasion of Poliomyelitis Probably Followed by Viruses of Other Diseases**

**E**XPOSED endings of the nerves of smell, in the delicate membranes lining the nose, are the gateway by which the virus of poliomyelitis (infantile paralysis) may enter the system. The nerve trunks to the brain, nerve connections in it, and nerves returning to the body surface are the paths the invasion follows. So long as it stays with nerve tissue, the disease virus is to a large degree isolated from the blood and lymph, so that protective substances formed in the body or introduced into it cannot reach it effectually, and it is free to continue its malignant work.

This, in brief summary, is the story of poliomyelitis invasion, as studied by Dr. Simon Flexner, director of the Rockefeller Institute for Medical Research, New York City, and reported before the National Academy of Sciences meeting in Cambridge, Mass. Dr. Flexner made his studies exclusively on rhesus monkeys, in which he produced the disease by introducing into their noses a suspension in salt solution of the spinal cord of a paralyzed monkey. But he extended the significance of his findings, stating:

"While this communication relates specifically to poliomyelitis, it applies in principle to still other infectious and inflammatory diseases of the brain and spinal cord."

Dr. Flexner then sketched the details of the progress of the infection:

"The virus gives rise to no detectable pathological changes in the nasal muc-

ous membrane. It possesses an affinity for the olfactory nerve cells—the organ of smell—which lie exposed in this membrane. The hairlike processes (dendrites) of these cells project into a layer of mucus which the virus enters to come in contact with the cells. The dendrites take up the virus and pass it on, by way of the axon or nerve fiber, to the olfactory lobe of the brain, whence it passes on still further, by nerve connections, to more distant parts of the brain and spinal cord. As the virus travels it becomes affixed to the motor nerve cells which control voluntary motion, injures them, and thus induces muscular paralysis. Other cellular changes, secondary and reactive in nature, are also induced in the nervous organs.

#### Carried by Olfactory Nerves

"Hence the olfactory nerves carry the virus from the periphery (nasal membrane) to the brain, and they also carry it in the reverse direction from the center (brain) to the periphery. This two-way transport has been shown for the first time in connection with the virus of poliomyelitis.

"The olfactory nervous structures are to a considerable extent isolated from the blood and lymph, which carry the protective, immune substances effective against impending infections," Dr. Flexner continued. "They afford, therefore, potentially a ready means of penetration of the virus into the central nervous system. It is only after the virus has

reached the brain that the cellular reactions in the system, detectable by microscopic and chemical examination of the cerebrospinal fluid, make possible the escape of these protective substances. This phenomenon is more strongly marked among children than among monkeys, which probably accounts for the occurrence of many cases of mild poliomyelitis among children and few among the experimentally infected monkeys.

"The influence of the isolation of the olfactory nerves is observed in monkeys artificially immunized to the virus. These monkeys may be protected against the paralyzing effects of the virus injected into the brain, and yet respond with paralysis to virus instilled into the nose.

"Although this report deals only with experimental poliomyelitis, evidence exists showing that other viruses having a strong affinity for the central nervous organs utilize the exposed olfactory nervous structures in the nasal membrane in order to reach the nervous system. The origin of certain epidemic, nervous diseases of the higher animals is becoming explicable in this way."

*Science News Letter, November 25, 1933*

#### PSYCHIATRY

## Physiological "Clumsiness" Feature of Mental Disease

**T**HE PERSON suffering from the type of mental disease known to psychiatrists as schizophrenia has characteristic physiological as well as mental symptoms, Dr. R. G. Hoskins, of the Memorial Foundation for Neuro-Endocrine Research of Harvard Medical School, reported.

The equilibrium of body fluids, blood gases, and oxygen consumption rates usually maintained by normal persons is upset in the schizophrenic patient. The basal metabolic rates of the patients vary in consecutive tests without apparent cause. The rate of using up oxygen not only varies abnormally, but the average rate is low as compared with normal individuals. Blood pressure, pulse rate, and red blood cell count are also low. The waste fluid output averages twice the normal amount, and the amount varies three times as much as for the normal person.

"The schizophrenic is characterized by physiologic 'clumsiness' as he is by lack of social adaptability," Dr. Hoskins said.

*Science News Letter, November 25, 1933*

## ASTRONOMY

# Cosmic Collapses Held Cause Of Birth of Spiral Nebulae

Abbe Lemaitre, of Expanding Universe Fame, Expounds A New Daring Theory Supported by American Data

**W**ORLDS are, because parts of the universe collapsed. This, in a sentence shorter than a telegram, sums up a theory of the genesis of the spiral nebulae, the vast islands of suns that swim at vaster distances apart in the depths of space, as presented by the Abbé Georges Lemaitre of Louvain University before a Washington audience of scientists.

The Abbé Lemaitre, who is at present a visiting professor at the Catholic University of America, developed this theory as a part of his larger theory of an expanding universe.

The universe, the lecturer reminded his hearers, is exceedingly empty. The masses of the stars, and of their aggregations into galaxies, are impressive; but when all matter is averaged out into all the space through which it is distributed, it comes to about one atom to a cubic yard of space. How could so thin a population of particles ever become aggregated into whole whirlpools of suns?

For answer, the Abbé postulated regional irregularities in his expanding universe—regions where the rate of expansion was slowed down to a certain critical low velocity. In some of these regions, the velocity of expansion failed to accelerate again; there were "collapses," permitting the aggregation of particles, and their condensation into the spiral nebulae.

Such a moment of critically low velocity of expansion, with resultant collapse and formation of aggregates of matter, occurred for the odd millions of light-years of space with which we are familiar about a billion years ago, Abbé Lemaitre suggested. This billion years is much less time than is called for by the theory of the passing of all stars through the same stages of development, from giant globes of unimaginably hot gases to aged "dwarf" stars of relatively feeble temperature energy. The Abbé does not think it necessary to postulate this uniform evolutionary course for all stars; his theory admits of

the simultaneous and very rapid formation of stars of all classes.

His contacts with American astronomers on his present visit to this country, he said, have supplied him with data which appear to support his present daring theory.

*Science News Letter, November 25, 1933*

## AVIATION-PHYSICS

## Improved Radio Beacon To Aid Aviators

**T**HE CHANCES for an air pilot to keep on his course or to reorient himself if he should become lost are now greatly increased, thanks to the innovations brought about in the present type of radio range-beacon by F. W. Dunmore of the Bureau of Standards.

The system makes possible the sending of four different signals in four directions, namely, one dot in a westerly direction, two dots east, three dots north, and four dots south. By noting which signal is the loudest the pilot may determine his general direction.

With the radio beacon now in general use the determination of absolute direction or position on airways is difficult because the same signal is sent to

four points of the compass. When the aircraft is near the radio beacon a pilot may pass from one course to another without knowing it. If lost it may take him an hour to reorient himself and the danger in case of shortage of fuel or the importance of time lost when on an errand of mercy will be apparent. It is believed by the inventor that the present scheme obviates these difficulties admirably.

The method consists of changing the so-called figure-of-eight transmission for the courses to the unidirectional cardioid transmission by changing the point of coupling into suitable phasing sections in the transmission line feeding the antenna, or, by superimposing on a figure-of-eight radiation through a suitable hybrid coil circular radiation in phase with figure-of-eight direction.

The method has been tried out extensively at the Bureau's experimental field at College Park, Md., and has been found altogether satisfactory. No additional equipment is required for receiving the signals on aircraft.

*Science News Letter, November 25, 1933*

## SOCIOLOGY

## City Dumps Tell Story Of Present Civilization

**S**INCE the present learns more about the past from city dump heaps than from art and literature, the picture below may well represent the chief source of knowledge concerning the current civilization to archaeologists of the future. At least, this is the view of officials of Logan Museum, Beloit, Wis., who prepared the diorama shown below. In the layer representing the (Turn Page)



**DIGGING INTO THE TWENTIETH CENTURY**

Here is a laboratory-built cross-section of a typical city dump heap showing the changing variety of articles discarded since 1893.

past decade appear an automobile radiator, electric flashlight, radio tubes, aluminum cooking ware and fashionable shoes. The 1913 to 1923 layer encloses a carpet sweeper, an old square toaster that was used on top of the stove, a coffee mill and, near the bottom, a whiskey bottle with a distinct air of good breeding. Down deeper another decade gives up an oil lamp, kerosene can, ornamental stove, fancy gas light fixtures and high lace shoes. From 1893 to 1903 it can be seen that people threw away funny brownish-looking old photographs, gramophone horns, irons that had to be heated over a fire, horseshoes and high button women's shoes.

*Science News Letter, November 25, 1933*

## CHEMISTRY

## Bootlegger's Tricks Legally Age Liquor

**M**ANY reputable distilleries, getting ready for the end of prohibition, are turning to some of the bootlegger's tricks in an effort to beat him at his own game by getting a supply of good liquor ready for the consumer in a hurry.

Quick aging of whiskey, so long as it does not involve rectification, is permissible under the law now as it was before prohibition and even during it for medicinal whiskey, Dr. W. V. Linder, chief of the technical division of the Bureau of Industrial Alcohol, explained. Rectification, the dilution or "cutting" of good whiskey with water, coloring matter and raw alcohol, is not permitted.

The various methods hastening the aging process nearly all involve heating the whiskey. At first this was done by putting the barrels in a warm room or by using a steam pipe. Then electric current was tried. Ultraviolet rays and even X-rays are among the methods that have been or are being tested.

Chemical processes to hasten the aging have involved the use of various charcoals that absorb the esters, fusel oils and other objectionable materials in raw whiskey.

Some 25 or 30 different concerns have applied at the Bureau of Industrial Alcohol for permission to try out various quick aging processes.

*Science News Letter, November 25, 1933*

"Turn down the electric lamp" may sound like a slip of the tongue, but you can do just that with the latest lamps: they come in three wattages, all combined in one lamp.

## CHEMISTRY

# Long-Known Chemical Found To be Most Versatile Solvent

**O**NE DREAM of the ancient alchemists, the "universal solvent," has been brought nearer to realization than ever before by the discovery that acetamide, a compound made from acetic acid and ammonia, has a wider range of solvent power than any other known substance. This discovery has just been announced by Prof. O. F. Stafford of the department of chemistry at the University of Oregon.

Because all life processes occur in solution, and because many important industries are dependent upon solubility relationships, Prof. Stafford's discovery is regarded by his colleagues as an outstanding contribution to the science of chemistry, both in its pure and applied aspects.

The best common solvents hitherto known have been ammonia and ordinary water; acetamide is declared to be superior to both. To test his discovery, Prof. Stafford ascertained the approximate solubilities of some 400 organic and 200 inorganic substances. Working on the theory that a substance is most soluble in another substance chemically related to it, he found that acetamide has such chemical kinship to an unusually wide range of other substances. That is, each of the atom-groups in its makeup reaches out, like a hand, toward similar atom-groups in many other compounds. It is this fact which gives it its great solvent powers.

Acetamide contains a methyl group that gives it solvent powers for hydrocarbons; its carbonyl group relates it to ketones, esters and acids; its tautomeric hydroxyl group gives it kinship to water and the alcohols; its amino group brings it into line with ammonia and its derivatives, while the ease with which it yields nitrile suggests a relationship to cyanogen compounds.

Acetamide has long been known to chemists, though its extraordinary solvent powers have only just been discovered. It is a solid at ordinary temperatures, but it melts at about 80 degrees Centigrade to form a mobile liquid. It is easily and cheaply manufactured from acetic acid and ammonia. Its ability to dissolve many things at present near-

ly or quite insoluble is expected to lead to important industrial applications.

Prof. Stafford is already well known in his field, especially for the invention of a process of wood carbonization, which is in large-scale use at an industrial plant at Iron Mountain, Mich.

*Science News Letter, November 25, 1933*

## PUBLIC HEALTH

## New Method Controls Scarlet Fever Epidemic

**A** NEW method of giving children resistance to scarlet fever has been reported by Drs. J. D. Allen, Jeshill Love and E. H. Sandlin of Louisville, Ky. The method is said to develop the children's resistance more quickly and with fewer and smaller doses than the method now in use and the resistance is said to last longer.

Instead of using a toxin produced by the scarlet fever germ to develop the resistance to the disease, the Louisville physicians have developed a preparation that is akin to the bacteriophage or "germ eater." They call it "phagoid."

The preparation was tried during an epidemic of scarlet fever in Louisville schools, at the request of the city health officer, Dr. C. H. Harris. None of the children developed scarlet fever after receiving the first dose and the epidemic was immediately controlled in every school.

*Science News Letter, November 25, 1933*

## PUBLIC HEALTH

## Public Told How To Combat Amebic Dysentery

**M**EANS of curbing the spread of amebic dysentery, which has already reached epidemic proportions, lie partly within the power of the general public, Chicago health officers declare. In view of nationwide dissemination of amebic dysentery, Dr. R. R. Spencer of the U. S. Public Health Service issued a statement stressing prevention aid.

The disease has reached epidemic proportions, Dr. Spencer said, because of the large number of healthy carriers uncovered among food handlers. The





Bell and Howell.

## ANTARCTIC CAMERA

This specially designed moving picture camera is now in the Antarctic with the Ellsworth expedition where it will be used to make on only 800 feet of film a continuous photographic record of terrain passed over during a return, non-stop, 3000-mile flight across the continent and over the South Pole. From an altitude of about 3000 feet pictures will be snapped automatically every few seconds. The southern midnight sun will furnish light during the estimated 24-hour duration of the flight. Prof. H. W. Nichols, geologist of Field Museum, is shown holding the camera.

finding of these carriers he attributed to the commendable efforts of Dr. Herman Bundesen. Dr. Bundesen is health commissioner of Chicago, where the outbreak started. The healthy carriers undoubtedly have unconsciously spread the infection throughout the country, Dr. Spencer said.

"Efforts at prevention," he said, "must be concentrated upon the discovery and proper treatment of carriers among public food handlers.

"Much can be done, also, to curb home infections by the education of the public in personal cleanliness and the careful washing and disinfecting of the hands of all persons who prepare food for others."

Science News Letter, November 25, 1933

## METEOROLOGY

## 23-Year Sunspot Cycle Gives Key to Long Range Forecasting

Encouraged by Predictions of Past Weather, Dr. Abbot Forecasts Scant Rain in Central India From 1942 to 1948

**S**UCCESSFUL long-range weather forecasting based on the mathematical study of the 23-year sunspot cycle was described before the meeting of the National Academy of Sciences in Cambridge, Mass., by Dr. Charles G. Abbot, secretary of the Smithsonian Institution.

During many years of study of variations in solar radiation, Dr. Abbot discovered a correlation between these variations and the number of sunspots, as the spot cycles wax and wane. The study was complicated and made highly difficult by the fact that there are a number of these cycles, of varying length, which overlap and often partially hide each other. Finally he perceived that all the periodicities in solar radiation are nearly submultiples of 276 months, or 23 years. These submultiples are obtained by dividing 276 by 3, 4, 6, 8, 11, 13, 15, 18, 25, 34 and 39. He thereupon conceived the idea that the tedious method of determining periodicities individually might be omitted, and their combined effect might be found by discussion of a 23-year cycle.

"This proved highly successful," said Dr. Abbot. "At Bismarck, N. D., the monthly mean departures from normal temperature for two periods, 1875 to 1898, and 1898 to 1921, gave features of great similarity. It was found, indeed, as was expected, knowing the irregularity of sun spots, that the principal features were subject to shiftings of several months due to changes of phase of constituent periodicities. This was allowed for by using slightly flexible scales of abscissae, alternately expansible and compressible in slight degree, when combining the two 23-year periods. When averaged with these slight adjustments and plotted as a prediction for the interval 1921-1933, the curve of forecast very closely represented the observed march of departures from normal temperature for those twelve years."

Dr. Abbot then represented in percentages of the monthly mean normal precipitation the observations at Bis-

marck, N. D., for the range 1875 to 1921, thus covering two 23-year cycles. Based thereon he made a similar forecast of percentage precipitation for 1921-1933, which proved to be in close accord, both as to magnitudes and features, with the observed values.

"The method is fortunately even more useful for forecasting precipitation than for temperature," Dr. Abbot continued. "Its inexactness is believed to be due to the difficulty of forecasting irregularities in the appearance of sun spots, and allowing for their affects upon the phases of the component periodicities of variation."

Encouraged by his success in "predicting" past weather, Dr. Abbot has ventured a forecast of weather in Central India for the years 1942 to 1948. Basing his opinion on a well-known, clear-cut cyclic correlation there, he states that subnormal precipitation is probable for that region during the six years mentioned. He states, however, that he feels it would be "premature to make extensive forecasts of this character. I hope to press forward the investigation."

Science News Letter, November 25, 1933

## PALEONTOLOGY

## Monkey-Like Fossils Found in California

**C**ALIFORNIA fossil beds of Eocene time, 55,000,000 years old, have yielded the remains of two hitherto unknown genera of lemuroid animals, creatures resembling monkeys but lower in the scale of life. The finds were described by Prof. Chester Stock of the California Institute of Technology before the National Academy of Sciences.

One of them represents the latest representative of the primate family known from America. No representatives of this lemuroid group had hitherto been described from California; all previously known specimens being from the Rocky Mountain region.

Science News Letter, November 25, 1933

## MEDICINE

**Idiosyncrasy to Food May Cause Facial Deformity**

**S**ERIOUS deformities of the face and teeth may result from idiosyncrasy or sensitivity to certain foods, Dr. Ralph Bowen of Oklahoma City has found. He described the case of a child who was sensitive or allergic, as physicians call it, to milk. Because of his idiosyncrasy to milk he was troubled with persistent itching of his nose and as a result he developed a habit of rubbing the end of his nose. Years of this nose-rubbing changed the shape of his nose so that it turned up sharply. The shape in the picture Dr. Bowen showed was like a pug nose so exaggerated as to be a deformity.

Depressions at the side of the nose and changes in the shape of the palate are other deformities brought about by the condition of nasal allergy. Dr. Bowen found dental deformities five times oftener in children suffering from nasal allergy than in non-allergic children of the large group he studied. He explained that many children suffer from chronic nasal allergy during the whole period when their sinuses are developing. The facial deformities are evidence of lack of development of the sinuses. X-ray pictures confirm this condition.

*Science News Letter, November 25, 1933*

## VETERINARY MEDICINE

**Vaccination May Protect Turkeys From Blackhead**

**V**ACCINATION to make turkeys safe against the disease known as blackhead, their worst scourge at present, was held out as a possibility of the future by Dr. Ernest Edward Tyzzer of the Harvard Medical School, who spoke before the autumn meeting of the National Academy of Sciences. Dr. Tyzzer warned against too sanguine hopes for immediate results, saying that "there are at the present time practical difficulties that prevent the adoption of the procedure for commercial purposes."

Dr. Tyzzer has made a study of blackhead disease for many years. Lately he has been propagating the one-celled animal organisms that cause it outside the bodies of turkeys, on artificial culture media. Grown for long periods in this way, the protozoön gradually loses virulence, he said. It remains infective for

young turkeys and other birds but no longer produces serious disease. Young turkeys infected through inoculated strains are protected against virulent strains of the protozoön which are almost 100 per cent. fatal to unprotected birds. The attenuated strains amount, in effect, to a vaccine analogous to the smallpox vaccine used on human beings.

Blackhead was tracked to its causal organism in 1895 by Dr. Theobald Smith, now of the Rockefeller Institute for Medical Research, with headquarters at Princeton, N. J., but at that time a member of the U. S. Department of Agriculture. The protozoön bears the name *Histomonas meleagridis*.

The disease afflicts quail, prairie chickens and ruffed grouse as well as turkeys. It also attacked the now extinct heath hen. Common chickens have it, but since it has very little effect on them they merely serve as carriers, and are probably the main channel for its fatal dissemination among turkeys.

*Science News Letter, November 25, 1933*

## MEDICINE

**Blood From Sleeping Sickness Victims Tested**

**U**NCLE SAM'S fighters against sleeping sickness are about to seek blood samples from victims of the disease in various large cities in the hope that they can discover just how immune a recovered person is to the malady.

Dr. W. G. Workman, U. S. Public Health Service assistant surgeon, is about to visit Pittsburgh with the co-operation of the local health department. He will study the location and clinical records of the encephalitis cases that occurred there at about the time that the encephalitis epidemic raged in and around St. Louis, where it has been intensively studied by a corps of government experts under the direction of Dr. J. P. Leake. Where there are not many encephalitis cases, blood will be taken from a few of those who have recovered from other acute diseases.

Mice have recently been discovered to be susceptible to sleeping sickness, and the blood serum collected will be used to determine whether or not the individual yielding the blood was or was not immune to the St. Louis type of encephalitis. The Public Health Service surgeons hope to obtain in this way some idea of the general distribution of immunity to this disease.

*Science News Letter, November 25, 1933*

**IN SCIENCE**

## GENERAL SCIENCE

**Wartime Protection Urged For Scientific Treasures**

**S**AFEGUARDING the world's scientific treasures against destruction in wartime was urged by Dr. Ales Hrdlicka of the Smithsonian Institution, in an address before the Third International Convention of the Roerich Pact and Banner of Peace.

Hundreds of scientific institutions containing highly important collections are scattered throughout the civilized world, the eminent anthropologist declared. Many specimens are of the greatest value to science, and could not be replaced.

"These collections are not merely the property of a local institution or the property of the people of one country," Dr. Hrdlicka said. "They are the evidence that all mankind depends upon, to show what has happened on the earth, and what has been achieved by human culture."

Paintings by the old masters, valuable to human culture as they are, have not the intrinsic importance to human progress that the collections amassed by science have, the speaker declared.

The need for the nations to safeguard the world's scientific treasures against war has become acute only in recent times. Fine scientific museums are comparatively new in civilization.

"During the World War, we found out what war can now do to cripple science," he said. "Freiburg, Germany, just over the Rhine, had a valuable collection of embryological material in its university. During one of the allies' bomb raids on a dark night, a bomb happened to fall on a building close enough to set fire to the building housing the collection. The material gathered there for scientific study represented years of research."

Dr. Hrdlicka proposed that a special committee be created, under auspices of the League of Nations, to catalogue the principal scientific collections and to draft regulations for mapping and marking places and objects to be respected in wartime.

*Science News Letter, November 25, 1933*



# THE FIELDS

## PHYSIOLOGY

### Freaks' Body Processes Slower Than In Normal Men

**C**IRCUS freaks, at least certain types of them, lead slower lives than do normal persons. This is the general conclusion indicated by studies of Dr. Allan Winter Rowe of Evans Memorial, Boston, reported in Cambridge, Mass., before the meeting of the National Academy of Sciences.

Dr. Rowe had an opportunity to study the metabolism, or rate of utilization of fuel-foods, of a group of dwarfs, an acromegalic giant, a "fat lady" and several other members of a freak troupe. He found that as a rule their basal rate of bodily processes was depressed. Abnormal function of the pituitary gland was a feature of the majority of the group.

*Science News Letter, November 25, 1933*

## PHYSICS

### Effects of Radio Waves Greatest on Dilute Solutions

**H**IGH-FREQUENCY radio waves, used in the treatment of paresis by inducing artificial fever, have the greatest heating effect on dilute solutions.

This is the conclusion reached by Joseph L. Donnelly, working at the University of Cincinnati.

He does not accept the statement that such waves have a heating effect only on living substances, and his work confirms that of Helen Hosmer and J. C. McLennan who also disagreed with this belief. He tried the effects of such waves on a number of non-living substances and found that solutions capable of conducting an electric current, such as acids and salts, can be heated by the high-frequency waves. The more resistant such a solution is toward the passage of an electric current, the more easily it is heated by the short radio waves: thus acetic acid heats more rapidly than sulfuric acid at the same dilution in water.

Solutions of non-electrolytes, substances incapable of carrying an electric current, cannot be heated by the short

radio waves. Mr. Donnelly tried such substances as dextrose and phenol, with negative results.

He is of the opinion that the phenomena he observed in his solutions may have some bearing on the physiological effects of high-frequency waves on cancer. Such malignant tissues grow in a more "watery" medium than the normal tissues around them, hence the waves will have a greater heating and killing effect on them than they have on the "drier" normal tissues.

These experiments are reported in *Science*.

*Science News Letter, November 25, 1933*

## VETERINARY MEDICINE

### Hormone Injections Replace Rejuvenation Operation

**P**ROF. EUGEN STEINACH has replaced his famous surgical operation for rejuvenation by injections of a highly concentrated form of the sex hormone, progynon, in combating sterility among cattle in Switzerland. The condition is of comparatively frequent occurrence in highly bred Swiss cattle.

The reports of Prof. Steinach's latest work recall that Gertrude Atherton wrote a novel about rejuvenation of women and called it *Black Oxen*. She probably did not anticipate the curious twist which scientists have now given her book and its title by performing rejuvenation operations to cure sterility in Swiss cows which, if not black oxen, are at least their near relatives.

Working with Prof. Frei of the Zürich University and the Swiss veterinary surgeons, Drs. Stäheli and Grüter, Prof. Steinach at first devised a method of treating sterility in cows by implanting ovarian tissues and in steers by grafts of male sex organs. The results were reported to be very satisfactory but the high cost of the treatment and the necessary training of the operators prevented it from becoming of practical value.

Further investigations showed that a single injection of progynonbenzoate under the skin of the animal's neck would cure sterility if it were of glandular origin. Out of 46 cases 44 were successfully treated, the results becoming apparent within 24 to 48 hours, it is claimed. Some of the animals were 9 or 10 years old and had been sterile for one or two years. The results were said to be due to reactivation of the ovaries.

*Science News Letter, November 25, 1933*

## GENETICS

### Evolutionary Changes Speeded By Aging Seeds

**M**UTATIONS, or sudden evolutionary changes in plants, can be speeded up notably by keeping their seeds until they are old, and then planting them. Demonstration of success with this method was offered before the meeting of the National Academy of Sciences by Prof. J. L. Cartledge of the University of Pittsburgh and Dr. A. F. Blakeslee of the Carnegie Institution of Washington's station for experimental evolution at Cold Spring Harbor, N. Y.

The two investigators planted seed of a specially bred strain of the common Jimson weed which they had kept up to ten years. Flowers from the resulting plants were examined for certain changes in the pollen, indicative of mutational changes. Plants from seeds less than one year old yielded mutations at a rate of only 0.6 per cent., while plants from seeds three to four years old yielded 3.7 per cent. of mutations, and plants from seeds seven to eight years old gave a "high" of 9.7 per cent. Ten-year old seeds produced plants yielding mutations at the somewhat lower rate of 7 per cent.

*Science News Letter, November 25, 1933*

## PUBLIC HEALTH

### Tuberculosis May Increase If Depression Continues

**H**EALTH officials foresee an increase in tuberculosis if the depression continues, according to a statement made by Dr. Henry F. Vaughan, Commissioner of Health of Detroit, to the National Tuberculosis Association.

"It will be a long time before tuberculosis, unquestionably wholly preventable, will be wholly conquered," Dr. Vaughan said.

"There is a feeling among public health administrators, with whom I am in accord, that if the depression continues, there will result an increase in the incidence of tuberculosis.

"The outcome will depend upon the success with which health organizations are able to maintain such services as diagnostic clinics, field nursing, preventoria, and hospitals, and especially the machinery for early case finding and the isolation of open cases of tuberculosis."

*Science News Letter, November 25, 1933*

PHYSIOLOGY

# A Matter of Muscles

## Facial Expression of Athletes in Competition is Studied By a Sculptor-Physician Who Molds Results in Bronze

By JANE STAFFORD

**D**ID YOU ever wonder why an exhausted runner nearing the finish line looks so surprised? It is true that exhaustion and surprise produce nearly the same expression on the human face, even though they do not feel at all alike.

The reason is that you use the same muscles, when you raise your eyebrows in surprise, that the sprinter uses when he is making his last desperate effort to pull his drooping lids open before utter weariness shuts them.

Dr. R. Tait McKenzie, professor of physical education in the University of Pennsylvania, has made a special study of facial expression in athletes. Because Dr. McKenzie is also a sculptor, he has learned the skillful tricks that artists use to portray emotion on canvas and in bronze and marble. It is all a matter of knowing which muscles are called into play by different feelings.

These muscles which produce such striking and extraordinary changes in expression differ from the general muscular system in that they have the power to move the skin in various directions. They are the remnants of the great muscle sheet that the horse or cow uses in summer to flick flies that bother him.

This relation between human facial muscles and muscles of other animals appears in the human expression of scorn, which, according to Dr. McKenzie, is a pale reflection of an expression seen in lower animals. You will see what he means if you watch a snarling dog "bare his fangs as he walks stiff-legged and bristling toward his enemy." When a haughty lady curls her lip in contempt and dislike, she is merely making a poor attempt at what the dog does, according to the sculptor-physician.

### Worked by Electricity

That the mechanism of facial expression is more a matter of muscles than feelings was shown by an experiment of a French scientist, Douchez. He worked with patients who had no sensations in the region of the face. Yet

he could contract their muscles by electrical stimulation and so produce various expressions. In this way he saw just which muscles were responsible for each expression of the face.

For example, it is a circular, purse-string muscle of the mouth that puckers the lips for whistling or kissing. The corrugator muscle that wrinkles the forehead is the one that produces the expression of pain. In fact, the French name of this muscle means, literally, muscle of pain.

No matter how different the emotions behind them may be, weeping and fury are not far apart. The chief difference between these expressions is in the fact that the eyes are closed in weeping but opened wide in fury.

### Weeping and Laughing

Weeping and laughing, on the other hand, both involve violent action of the respiration, but the combination of muscles used is slightly different. There is a sketch by Rubens which clearly shows how laughter interferes with breathing. In this picture you can see that the man's blood pressure is rising and tears are coming from the pressure of the eyelids over the eyes. Rodin, the famous French sculptor, has shown how the muscles are used in producing the expression of weeping in his study of the Weeper.

Muscles are accountable for that elusive expression known as "looking pleasant" without definitely smiling. The artists have tricks for portraying this, too. The famous and much-discussed expression of the Mona Lisa, for instance, was achieved by the simple trick of painting the lady with a smile on one side of her face only, Dr. McKenzie explained. Leonardo Da Vinci, who painted her, would have been much surprised at all the discussion and controversy over his masterpiece, in Dr. McKenzie's opinion. If you look at only one side of the lady's face at a time, covering the other or varying your concentration, Dr. McKenzie says, you will see that the difference is merely that one side of the mouth is raised in a

slight smile, while the other is not.

"To the layman, this is a mystery," Dr. McKenzie said, "just as is the fact that the eyes of a front-face portrait have the disconcerting power of following you about the room."

Another artistic trick, which has really become a convention, consists in portraying the expression of adoration by raised head and upturned eyes. DuBois, in his famous statue of Jeanne D'Arc in front of the Rheims Cathedral, showed the Maid in this attitude, and you will find it repeated again and again in old paintings of the saints and in the works of modern artists, too.

To go back to the similar expressions produced on the face by exhaustion and surprise, Dr. McKenzie recalled that the eyes are ordinarily held open by the muscles of the eyelids. But when you are completely exhausted, and these tired, perhaps paralyzed, eyelid muscles can no longer hold your lids open, you call on the larger muscles in your forehead that pull up the eyebrows and at the same time pull the drooping lids apart enough for you to see. Accordingly, if an artist wants to show either surprise or exhaustion on his canvas, he paints the eyebrows curved and high in the face, with little wrinkles above them, and with the upper lids covering perhaps half of the eye.

### Try It on Yourself

You can see it in the mirror if you watch your own face when you try to keep your eyes open just by pulling your eyebrows up.



### MATHEMATICS IN A CHANGING WORLD

an address by

**Dr. Arnold Dresden**

Professor of Mathematics  
and Astronomy, Swarth-  
more College

Wednesday, November 29,  
at 4:35 p. m., Eastern Stand-  
ard Time, over Stations of  
the Columbia Broadcasting  
System. Each week a promi-  
nent scientist speaks over  
the Columbia System under  
the auspices of Science  
Service.



EFFORT

BREATHLESSNESS

FATIGUE

© Dr. R. Latt McKenzie.  
EXHAUSTION

The face of physical effort, preceding exhaustion, is the face of rage, Dr. McKenzie has observed. You see it on the faces of sprinters who are exerting themselves to the utmost, particularly those who are not winning the race. In fact, Dr. McKenzie humorously pointed out, if any but the winner comes in without wearing that look of rage and fury he is apt to hear about it from the coach.

The expression is caused by a veritable explosion of energy in which the eyebrows are drawn down, the blood pressure is raised, the veins are enlarged and stand out, and the eyes are closed, if possible; though this is a dangerous procedure as the runner is apt to fall. This same explosion of energy makes the man hold his breath, draw up the upper lip and draw down the lower one, though not at the corners, and clench his teeth. The closing of the eyes is a protective measure, to guard the delicate blood vessels from rupture due to the enormously increased pressure on them. This expression of rage and fury actually helps the runner with his race, Dr. McKenzie explained.

The sculptor-physician has made a long study of the facial expressions of athletes in competition, noting how they reflect the physiological processes of the various stages of exertion. There is strong resemblance between the expressions of the athletic competitors, particularly in track events, and the expressions seen in some stages of illness, he found.

#### Four Bronze Masks

In the course of his study, he modelled four bronze masks showing the expressions of violent effort and of the progress of fatigue.

One of these masks shows the expression of violent effort which Dr. Mc-

Kenzie described as being akin to that of rage.

The second mask is that of the breathless runner. This man wears the anxious face of mental distress. The same expression is seen on the patient suffering from double pneumonia or from a rapidly failing heart.

"No form of physical anxiety is more terrible," Dr. McKenzie said of breathlessness.

At this stage in the race, the man's tired eyes tend to close. His eyebrows are wrinkled. His open mouth gasps for breath. During the first part of the race there may be a feeling of exhilaration, but soon the feeling of distress becomes more acute. The runner feels as if a tight band were drawn about his chest and this is exactly the way his face looks. Dr. McKenzie pointed out how, at this stage, the man's nostrils are widely dilated, his lips retracted, the angles of his mouth drawn down and his head thrown back to make a straight way for the air to come down to his lungs.

#### "Second Wind"

After this stage the runner gets what is popularly called his "second wind." Dr. McKenzie explained this as the moment when the respiration and heart action catch up with the output of waste products in the blood stream. You can see the relief in his face, just as you can see the stupor-like look of intoxication which marks the third stage of fatigue.

Here is seen the dazed expression of semi-consciousness. The expression of the upper eye-brow is softened. The eyes appear very tired. The lips are not drawn back so sharply. In this condition the man may stumble or may unintentionally commit a foul. He

fights off exhaustion by closing his eyes and raising his eyebrows, at the same time throwing back his head.

This expression gives way to that of exhaustion. He draws up his lids to keep his eyes open and opens his mouth more widely. At the same time, he attempts to balance his head with the least possible muscular effort. You will see this same tilt of the head in the weary commuter, catching a few minutes sleep on the train, or in the person who sleeps during church services.

#### "Little Death"

In the athlete, it is part of his last fight to keep off syncope, which Dr. McKenzie called the "little death," and which is a temporary suspension of consciousness due to brain anemia.

For when you see the athlete finally collapse over the finish line you are getting a sudden glimpse of death. At this time if the man's eyelid is raised, it will be seen that his eyeball is turned upward; his nostrils are pinched and his eyes are deep in the socket.

"For the time being, he is dead," Dr. McKenzie said. "It is the little death of syncope."

The expression has been portrayed in art, notably on the face of the Christ as painted by Hans Holbein the Younger in his conception of the entombment.

"Fortunately," Dr. McKenzie concluded, "the syncope of exhaustion is short and the athlete quickly recovers. The heart resumes its function and a healthy color comes back to his face, and he is ready again to show in a future contest the rage and fury of violent effort, the pain and anxiety of breathlessness, the drunken stupor of fatigue and the equivocal, pained pseudo-surprise of exhaustion."



## MEDICINE

## Encephalitis Patients Develop Protective Substance in Blood

SCIENTISTS working at the National Institute of Health in Washington and at the Rockefeller Institute for Medical Research in New York City have discovered that encephalitis patients develop in their blood substances known as immune bodies which give resistance to the disease.

It is much too early to talk of this discovery leading to a cure or even to prevention of the disease, however, in the opinion of Dr. Charles Armstrong of the U. S. National Institute of Health.

Both groups of scientists worked with a strain of mice, bred at the Rockefeller Institute, that are especially susceptible to virus diseases, which encephalitis is considered to be. They were able to produce the disease in mice by injecting material from the brains of encephalitis victims in the recent St. Louis epidemic. Serum from the blood of other St. Louis encephalitis patients protected mice from such injections, giving them resistance to the disease.

This proved that the disease produced in the mice was the same as that occurring in patients in St. Louis and was not another animal disease, Dr. Armstrong explained. Establishing the disease in mice is of great practical importance because it enables scientists to continue their studies on these animals instead of on the much more ex-

pensive monkeys with which they have previously had to work.

Giving blood serum from recovered encephalitis patients to sick people would probably not help much in checking encephalitis if it has already developed, it was pointed out. In mice, the protective dose can be given at the same time as the infecting dose. Using the convalescent serum to protect man from the disease is not very practical, since there is no way of knowing in advance which persons are going to need the protection it might give.

*Science News Letter, November 25, 1933*

## ASTRONOMY

## Leonids Fail To Flash; Watchers See Few Meteors

PATIENT watchers of the skies at the Flower Astronomical Observatory, Upper Darby, Pa., sat up all night Wednesday, Nov. 15, waiting for the hoped-for spectacular Leonid meteor shower—and got nothing for their pains. The shower just didn't materialize. Prof. Charles P. Olivier, director of the Observatory, wired Science Service that during a period of six hours only 102 of the shooting stars flashed out, whereas in the great Leonid displays of earlier days they streaked the sky in thousands. On Tuesday night,

Nov. 14, the seeing was bad on account of clouds, but during about forty minutes of clear sky only two meteors were seen.

Although the Leonid meteor shower did not break into the splendor that astronomers hoped for, a fair display was seen by a group of five watchers at Columbia College, Dubuque, Iowa, under the leadership of Rev. John Theobald, professor of mathematics. At three a. m. Thursday, Nov. 16, the shooting stars were falling at the rate of sixty an hour, which increased to a rate of seventy an hour at 4 a. m.

At Iowa Wesleyan University, Mt. Pleasant, Iowa, Prof. James Van Allen reported seeing the meteors at the rate of about thirty per hour on the night of Monday, Nov. 13, and slightly fewer on the night of Tuesday, Nov. 14. After that the sky was overcast and no observations were made.

Observers at the State University of Iowa, under the direction of Prof. C. C. Wylie, saw only moderate numbers of the meteors on several nights of watching. Prof. Wylie called attention, however, to the possibility of the shower's being seen to better advantage in another, far distant part of the world, since the most brilliant development of the Leonid display lasted only about six hours in the days of its greatest glory, so that later reports may bring the news that Europeans or Asiatics saw what Americans missed.

*Science News Letter, November 25, 1933*

## PHYSIOLOGY

## Blood Compound Causes Dilatation of Vessels

BLOOD vessels are dilated by a specific substance found in the blood and also in the body tissues. This chemical compound, identified as adenosine triphosphate by Prof. Cyrus H. Fiske of the Harvard Medical School, was discussed by its discoverer before the meeting of the National Academy of Sciences.

Previous investigations had disclosed its presence only qualitatively and its chemical make up only in part, but recent work by Prof. Fiske has achieved practically quantitative basis. The action of the compound causes, among other physiological effects, the reddening associated with such conditions as fever, inflammation and exposure to heat.

*Science News Letter, November 25, 1933*

## SUBSCRIBERS in foreign countries PLEASE TAKE NOTICE!

Because of the steady increase in the number of subscribers to SCIENCE NEWS LETTER who live in foreign countries, the extra postage charges have become a major item of expense. Therefore, effective January 1, 1934, extra postage charges should be remitted as follows, with the subscription price:

**\$2 a Year extra postage to Canada and Foreign Countries**

# Which of Your Friends?

Which friends would value SCIENCE NEWS LETTER as a Christmas Gift?

**W**HY not use SCIENCE NEWS LETTER as a personally tested gift for good friends, men or women whom you know have intellectual curiosity. If its thoroughness, accuracy and brevity have brought you satisfaction and enjoyment, these same qualities will be really useful to some whose names are on your Christmas list.

Send SCIENCE NEWS LETTER and then rest assured that you have given one of the most appropriate remembrances, not only because it will be received each week during the year, but also because of the special Christmas wrappings that are to enclose the first copy of your gift subscription.

Plans have been made for the first SCIENCE NEWS LETTER of your gift subscription to arrive with all the flurry and joy of Christmastide.

The first copy will greet your friends beautifully wrapped and enclosed in a crinkly paper, holly green Christmas box. Each box will be sent by Special Delivery mail to be delivered in the midst of the excitement of December 25.

Your gift box will also contain a silver and fire-cracker red Christmas card with your name inscribed upon it. (See the illustration here).

SCIENCE NEWS LETTER is an increasingly popular Christmas present among our subscribers. Last year, gift subscriptions increased 52 per cent. over the preceding year.

Special Christmas subscription prices are below:

## Christmas Rates:

One subscription (1 year).....	\$ 5.00
One subscription (2 years).....	\$ 7.00
Two (1 year) subscriptions.....	\$ 7.00
Three (1 year) subscriptions.....	\$10.50
Additional (1 year) subscriptions.....	\$ 3.50 each

In connection with a Gift Subscription, your own subscription may be renewed at the special Christmas rate of \$3.50 a year.



This is the way the gift

Science News

Letter will be re-

ceived—wrapped in a

holly green, crinkly paper box carrying a card with your name on it. Delivery by special delivery mail.

To SCIENCE NEWS LETTER  
21st and Constitution Avenue, N. W.,  
Washington, D. C.

SEND SCIENCE NEWS LETTER for one year, as my gift, mailing the first copy boxed and with Greeting Card as above, to the following:

Name.....

Street Address.....

City and State.....

Name.....

Street Address.....

City and State.....

RENEW my own subscription for ☐ One year ☐ Two years

☐ I enclose \$\_\_\_\_\_ in payment of the above subscriptions.

☐ I will remit \$\_\_\_\_\_ on receipt of your bill on January 1.

MY NAME .....

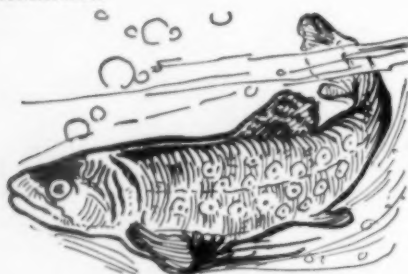
Street Address .....

City ..... State.....

(19125)



ICHTHYOLOGY



### The Breath of a Fish

**F**ISH, we are prone to imagine, get along without air. They live in a medium that would quickly strangle us if we were immersed in it—for drowning is primarily death by oxygen starvation. Yet they must have air just as we must, and without it they too will drown.

The fish's secret is that he can get the air (or rather, the oxygen) he needs out of the water itself. Not from the "O" in the  $H_2O$ : in the water the oxygen is bound firmly to the hydrogen, and useless for respiration purposes. But dissolved in almost all water as it occurs in nature is a certain amount of the all-necessary gaseous element, and if one is properly equipped to get it out, why, one can live perfectly well in water and never miss the air.

The fish's equipment for getting this oxygen is his outfit of gills—the red fringes, row on row, that lie under those slits that are where the sides of his neck would be if he had any neck. Gills are filled with blood inside, and present a very large surface to the water

outside, so that the water as it flows past comes into close contact with oxygen-greedy blood, that pulls in the dissolved element through the thin gill walls. The fish's circulatory system is so arranged that the blood from the heart is pumped first through the gills, then around through the body and back to the heart again, just as the cooling water in an automobile is pumped first through the radiator and then through the engine jacket and back to the pump.

The more active a fish, the livelier the water it likes to live in; for swift currents in streams and waves on lakes or seas help to mix oxygen in the water and thus become more charged with it than are sluggish streams and stagnant pools. Thus we find trout in swift mountain brooks, and catfish on the muddy beds of slow rivers; nervous, active sharks at the surface of the seas, and almost sedentary flounders lying on the bottom. The less oxygen, the less chance to be vigorous.

PHYSIOLOGY

## New Theory Explains How Cells Develop Resistance

**A** NEW THEORY of how certain cells of the body develop resistance to injury was described by Dr. William deB. MacNider of the University of North Carolina before the Southern Medical Association. For the scientific studies leading to the development of this new theory, Dr. MacNider was awarded the research medal of the Association.

The theory may explain what happens to some patients suffering from chronic Bright's disease and to mothers who develop kidney trouble just before the birth of a child.

Certain cells of the kidneys and liver, known to scientists as fixed tissue cells, can be injured by such poisons as bichloride of mercury, uranium and chloroform, Dr. MacNider explained. He investigated the results of such injuries in animals and found two types of reaction.

In one type the injured cells may regenerate or "come back" in a form similar to their original cell form. These cells, he found, had no resistance to future injury by the same chemicals. On the other hand, the cells may regenerate or come back in a changed form which

Among the slowest and least active of all the fish in the world are the tropical lungfishes, some of which do not have functional gills at all, but depend entirely on air breathed by means of a primitive sac-like lung they have. To fill this they must come to the surface once in a while, just as a whale must come up to "blow."

Lungfishes live in the muddiest, most stagnant pools that anything can stay alive in, and when these uninviting dwelling-places become nearly dried up in summer they "aestivate" just as ground-squirrels and turtles hibernate retreat into a burrow, lapse into so deep a sleep you would think them dead, and live on their stored food until better times come again. Only the lungfish must store oxygen as well as food: the last lungful of air they take in before they retreat into their burrows has to last them for weeks, even months. No wonder a lungfish is not lively!

*Science News Letter, November 25, 1933*

## KNOWLEDGE

The Magazine of Scientific Progress

Among articles in current issues:

The Phenomenon of Black Light. Animals that Mend Themselves. How Death Comes About. Seeing Without Eyes. How Sunspots Affect the Earth. The Art of Plastic Surgery. Houses of Glass. Natural Avoidance of Conception.

Authoritative—Up-to-Date—Simply written

KNOWLEDGE is 25c. at the better news-stands. Send 25c. for sample copy or \$1.00 for 5 issues to KNOWLEDGE, 310 Riverside Drive, New York

is not the normal type of cell but which is capable of doing some work. This type of cell is resistant to many times the amount of the same injurious chemical that produced the change.

Dr. MacNider observed dogs that developed acute Bright's disease from bichloride of mercury or uranium poisoning. When the animals were slightly ill and then recovered, with no change in the type of cells in the kidneys, they had no resistance to further poisoning with the chemicals. But when animals became very ill and recovered, their kidneys having been paired with an abnormal type of fixed cells, they developed a very great deal of resistance to the chemicals.

From these studies, Dr. MacNider concluded that the mother who is very ill of kidney disease before her child is born, but who recovers, can generally have more children without any further trouble, because the cells in her kidneys have come back in this abnormal, highly resistant form. On the other hand, the patient who is only slightly ill will probably have trouble before the birth of subsequent children.

*Science News Letter, November 25, 1933*



# ● First Glances at New Books

Additional Reviews  
On Page 352

## Meteorology

**THE DRAMA OF WEATHER**—Sir Napier Shaw—*Macmillan*, xiv+269 p., \$3.50. Sir Napier has that excellent combination, fortunately frequent in English men of science, of knowing a great deal about his subject and knowing also how to say it so that it will entertain the person who knows nothing about it, and so instruct him unawares. With vigorous readable text, with beautiful photographs and clean-cut diagrams and maps, he has built a book about the weather that should add fresh information and zest to conversations even about this most-discussed of all topics, as well as find a more serious and permanent occupation in the working libraries of all who have outdoor occupations or interests.

*Science News Letter*, November 25, 1933

## Ethnology—Archaeology

**FORTY-EIGHTH ANNUAL REPORT OF THE BUREAU OF AMERICAN ETHNOLOGY, 1930-1931**—*Govt. Print. Off.*, 1220 p., \$2. Aside from a few pages of "annual report," this entire volume is a fine index of the previous 47 reports. It comes, therefore, as a welcome addition to the reference literature on the American Indian, and very especially welcome to those who have often gone hunting through the 47 reports for some valuable but elusive piece of information known vaguely to have appeared in the series. The index is by Biren Bonnerjea.

*Science News Letter*, November 25, 1933

## Medicine

**ANNUAL REPORT, 1932**—*Rockefeller Foundation*, 455 p., free. The bulk of the report is taken up with description of the health and medical activities which include research in yellow fever, malaria, tuberculosis, hookworm and other diseases.

*Science News Letter*, November 25, 1933

## Engineering

**AZIMUTH DETERMINATION**—E. F. Coddington—*Ohio Eng. Exper. Sta.*, 73 p., 50c.

*Science News Letter*, November 25, 1933

## Physics

**INTRODUCTORY PHYSICS**—L. Grant Hector—*American Book Co.*, 372 p., \$3. Here is a text which claims to modernize the teaching of elementary physics by presenting the entire subject from

a modern standpoint in place of inserting isolated chapters on modern subjects. Even in the most elementary electrical phenomena, modern concepts of electrons, protons and ionized atoms are used, but the student is warned that further experiments may modify present views. The book, which is based on experimental work at the University of Buffalo, will certainly be more interesting to the average student than the orthodox text.

*Science News Letter*, November 25, 1933

## Electronics

**ELECTRONS AT WORK**—Charles R. Underhill—*McGraw-Hill*, 354 p., \$3. All who desire a general knowledge of the subject of electronics or wish to inform themselves of the latest advances in the field will be well satisfied by this text. Fundamentals and applications are traced in semi-popular style. Here is opportunity for understanding through entertaining reading one of the most recent and greatest revolutionizing forces of industry.

*Science News Letter*, November 25, 1933

## Standardization

**REPORT OF THE NATIONAL SCREW THREAD COMMISSION**—*Govt. Print. Off.*, 171 p., 15c. Evidence of the usefulness of one of the government organizations recently abolished in the Federal reorganization plan. Happily, the work of the National Screw Thread Commission will continue as a part of the National Bureau of Standards under which it has previously functioned. This report, the fourth to be published, gives the present standards for screw threads of various sorts.

*Science News Letter*, November 25, 1933

## Engineering Materials

**A. S. T. M. STANDARDS ON PRESERVATIVE COATINGS FOR STRUCTURAL MATERIALS, Paints, Varnishes, Lacquers and Paint Materials**—*American Society for Testing Materials*, 350 p., \$1.25.

*Science News Letter*, November 25, 1933

## Zoology

**STRANGE ANIMALS AND THEIR WAYS**—Ralph and Fredrica De Sola—*Scribners*, 65 p., \$1.50. A simply written natural history book for younger readers, well illustrated in black-and-white by Norman Borchardt, with foreword by Raymond L. Ditmars.

*Science News Letter*, November 25, 1933

## Sociology

**IMMIGRATION AND ASSIMILATION**—Hannibal Gerald Duncan—*Heath*, 890 p., \$3.80. A comprehensive text for the study of a major problem in racial trends. Opening with a glimpse of the world, and a closer look at the backgrounds for immigration in one country after another, the author then proceeds to the second half of his book. This deals with the immigrant in the United States and the process of his assimilation. An interesting and worthwhile feature is the series of life histories of American immigrants of the first, second, and third generations. For the student, suggested exercises, questions, and problems for investigation are provided at the end of each chapter.

*Science News Letter*, November 25, 1933

## History—Travel

**SANTIAGO DE LOS CABALLEROS DE GUATEMALA**—Dorothy H. Popenoe—*Harvard Univ. Press*, 74 p., \$1.50. A pleasantly worth while guide book, for stay-at-homes as well as for those fortunate enough to visit Guatemala. The subject is the ruined capital of colonial Guatemala. But so plain a statement scarcely does justice to the scope of the book, for the author conjures up a vivid pageant of Indian life, Spanish conquest, colonial days, and finally present scenes of crumbling and romantic ruins. The attractive illustrations are also by the author.

*Science News Letter*, November 25, 1933

## Philosophy

**MAN IN THE MODERN AGE**—K. Jaspers—*Holt*, 243 p., \$2.50. Unlike most of the post-war German philosophers, who seem to have been trying to become super-Sopenhauers for pessimism, Prof. Jaspers feels that the human soul can yet escape from the jungle of overcrowding things. "Pulling himself together on the border-line of destruction, the independent human being may arise, one who will take matters into his hands and enjoy true being." Translated by Eden and Cedar Paul.

*Science News Letter*, November 25, 1933

## Mechanical Engineering

**A STUDY OF THE LOCOMOTIVE FRONT END, INCLUDING TESTS OF A FRONT-END MODEL**—Everett G. Young—*Eng. Exper. Sta., Univ. of Illinois*, 182 p., \$1.

*Science News Letter*, November 25, 1933

# •First Glances at New Books

Additional Reviews  
On Page 351

## Psychology—Education

**BUSY CHILDHOOD**—Josephine C. Foster—*D. Appleton-Century*, 303 p., \$2.50. With the approach of long, stormy winter Saturdays and the arrival of the annual problem of selection of Christmas games and toys, those interested in children will welcome enthusiastically this book which tells what scientific study has revealed regarding the happy, constructive activities of childhood. It contains the answer to that most pathetic of all child questions, "What shall I do?" The responsibilities that should be given the child and the work that should be taught them is discussed as well as a great variety of amusements.

*Science News Letter, November 25, 1933*

## Psychology—Education

**HAPPY CHILDHOOD**—John E. Anderson—*D. Appleton-Century*, 321 p., \$2.50. Every child has certain needs—security, affection, motor skill, knowledge, independence and so on. An expert on child development here discusses each of these in turn and what parents and others can do to aid the child in his various quests. The book is based primarily on reports of the White House Conference.

*Science News Letter, November 25, 1933*

## Biology

**DYNAMIC BIOLOGY**—A. O. Baker and L. H. Mills—*Rand McNally*, 722 p., \$1.72; **ACTIVITIES FOR DYNAMIC BIOLOGY**—Same authors—*Rand McNally*, 218 p., 80c. Text and work-book for a complete course in biology for high schools.

*Science News Letter, November 25, 1933*

## Management

**SALES MANAGEMENT TODAY**—J. Russell Doubman—*Sears*, 342 p., \$3. A member of the faculty of Wharton School of Commerce has written a useful and practical text for those who would manage salesmen. It is recommended to both the student and the aspiring salesman.

*Science News Letter, November 25, 1933*

## Aeronautics—Physics

**THE PRINCIPLES OF AERODYNAMICS**—Max M. Munk, 260 p., \$1.75. Intended to make the principles of aerodynamics understandable to anyone with a high school education in mathematics, this book should interest those engaged

in airplane design who are more interested in the physical and practical end of the subject than in its mathematical aspects. The author is now lecturer in aerodynamics at the Catholic University of America and he is known as an authority on his subject through his work at Langley Field and elsewhere.

*Science News Letter, November 25, 1933*

## General Science

**INTERNATIONAL INTELLECTUAL CO-OPERATION, 1932**—League of Nations, International Institute of Intellectual Cooperation—*World Peace Foundation, Boston*, 147 p., 50c. While political, economic and military experts pile disagreement on disagreement and crowd the world daily closer to the edge of the abyss, scientists, humanists and other men and women of good will daily show that real internationalism is possible under the aegis of the much-belabored League of Nations. Another year's progress is here recorded.

*Science News Letter, November 25, 1933*

## Mathematics

**AN INTRODUCTORY COURSE OF MECHANICS**—E. G. Phillips—*Cambridge Univ. Press*, 255 p., \$3.25. Regarding his subject as a branch of mathematics rather than as an ancillary to physics or engineering, the senior lecturer in mathematics at the University College of North Wales presents a complete and thorough text for the first year's course.

*Science News Letter, November 25, 1933*

## Entomology

**REVIEW OF THE WASPS OF THE SUB-FAMILY PSENINAE OF NORTH AMERICA (HYMENOPTERA: ACULEATA)**—J. R. Malloch—*Smithsonian Institution*, 60 p., 2 pl.

*Science News Letter, November 25, 1933*

## Mathematics

**LOGARITHMIC AND TRIGONOMETRIC TABLES**—William L. Hart—*D. C. Heath*, 124 p., \$1.32. Squares and square roots, three-place, four-place, five-place logarithms and other related tables.

*Science News Letter, November 25, 1933*

## Meteorology—Geography

**MOUNT WASHINGTON REOCCUPIED**—Robert S. Monahan—*Stephen Daye Press*, 270 p., \$2.50. The experiences of the scientific expedition upon the highest mountain in New England, during the winter 1932-33, written in diary form. Not since 1892 had Mt. Washington been occupied by a weather station. Joseph B. Dodge and his fearless crew of young men operated the only truly high mountain meteorological station in North America during the International Polar Year just closed. The weather watch is continuing this winter with the aid of Dr. Charles F. Brooks and the meteorological activities of Harvard and M.I.T.

*Science News Letter, November 25, 1933*

## Economics—Politics

**AMERICA SELF-CONTAINED**—Samuel Crowther—*Doubleday Doran*, 340 p., \$2. One of our best-known isolationists states his full credo. A sample proposal is interesting: "If the flat refusal of foreign nations to meet the service on their war debts be taken as an overt act, it would not be out of reason simply to commandeer the foreign investments in the United States and also to impound foreign bank balances. If the foreign nations then did likewise with American-owned foreign investments, our own government could take up their claims and issue government securities. This could clear the air." And probably bring on our necks such a ganging-up of the nations as to make even the best efforts of Wilhelm II or his small successor, Hitler, seem puerile and amateurish.

*Science News Letter, November 25, 1933*

## Education—Sociology

**THE OBLIGATION OF UNIVERSITIES TO THE SOCIAL ORDER**—*New York Univ. Press*, 503 p., \$2. The addresses and discussion at the conference of universities, held under the auspices of New York University in 1932 in celebration of its first one hundred years of instruction, are in this volume made a permanent and useful record.

*Science News Letter, November 25, 1933*

Science News Letter will secure for its subscribers any book or magazine in print which was published in the United States. Send check or money order to cover regular retail price (\$5 if price is unknown, change to be remitted) and we will pay postage in the U. S. When publications are free, send 10c for handling. Address: Book Dept., Science News Letter, 21st and Constitution Ave., Washington, D. C.